

### REMARKS

The above amendments to the above-captioned application along with the following remarks are being submitted as a full and complete response to the Office Action dated December 27, 2006, and the telephone interview conducted on April 18, 2007. Applicants thank the Examiners for taking the time to conduct the telephone interview. In view of the above amendments and the following remarks, the Examiner is respectfully requested to give due reconsideration to this application, to indicate the allowability of the claims, and to pass this case to issue.

### Status of the Claims

As outlined above, claims 21-51 stand for consideration in this application, wherein claims 21, 31 and 37 are being amended to correct formal errors and to more particularly point out and distinctly claim the subject invention.

All amendments to the application are fully supported therein. Applicants hereby submit that no new matter is being introduced into the application through the submission of this response.

### Interview Summary

On April 18, 2007, an interview was conducted by telephone with the Examiner and his supervisor. Agreement was not reached during the interview regarding patentability of the present invention claimed.

### Formal Objections

#### Claim

Claims 21-30 and 37-51 were objected to on the ground of the informalities. Particularly, the Examiner asserted that the recitations in claims 21 and 37, "the change-over instruction including information identifying a second inner logical volume of the inner logical volumes" is not clear.

Claims 21 and 37 are being amended so as to meet the formalities as set forth above. Therefore, their dependent claims 22-30 and 38-51 also meet the formalities. Accordingly, withdrawal of this objection is respectfully requested.

## Prior Art Rejections

### 35 U.S.C. §103(a) rejection

Claims 21-51 were rejected under 35 U.S.C. §103(a) as being allegedly unpatentable over Hirakawa et al. (US 2002/0188768 A1), Mogi et al. (US 2003/0229645 A1) in view of Guha et al. (US 2004/0054939 A1). This rejection is respectfully traversed for the reasons set forth below.

According to the Manual of Patent Examining Procedure (M.P.E.P. §2143),

To establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both not be found in the prior art, not in the applicant's disclosure.

### Claim 21

Claim 21 as amended recites that the channel adapter receives a command including a change-over instruction from the computer to be stored in the second upper logical volume, the change-over instruction including information identifying a second inner logical volume of the inner logical volumes to be mapped to the first upper logical volume; the channel adapter maps the second inner logical volume instead of the first inner logical volume to the first upper logical volume in response to the change-over instruction stored in the second upper logical volume, and the channel adapter further operates to start a second set of disk drives from the plurality of disk drives that are mapped to the second inner logical volume; and activation of the second set of disk drives that are mapped to the second inner logical volume starts in response to change-over from the first inner logical volume to the second inner logical volume.

The upper logical volumes are virtual volumes which do not have actual memory regions. The inner logical volumes have actual memory regions. By change-over instruction recited in claim 21, mapping of the first inner logical volume to the first logical volume is changed to mapping of the second inner logical volume to the first logical volume. In other words, change-over instruction recited in claim 21 instructs to change an inner logical volume, which has actual memory regions, to be connected to a virtual volume. The second set of

disk drives that are mapped to the second inner logical volume starts in response to this change-over.

In contrast, as admitted by the Examiner, Hirakawa does not show or suggest multiple layers of logical volumes, namely upper logical volumes and inner logical volumes. Hirakawa merely shows remapping logical volumes in one layer, namely, remapping physical addresses of destinations of the logical volume (paragraph [0041] on page 3). The Examiner asserted that it would have been obvious to one having ordinary skill in the art at the time of the invention to use hierarchical volumes as taught by Mogi in the system of Hirakawa to allow transparent and dynamic storage allocation and isolate the internal structure of a logical volume from the logical perceived by a host, referring to paragraphs [0008]-[0010] of Mogi. Applicants respectfully disagree. Mogi merely states alteration of data mapping in a computer system having the virtualization function. Mogi shows in Fig. 2 multiple layers comprising a logical volume 204, a virtual volume 206 and a logical disk drive 208. However, Mogi merely shows changing mapping of a virtual volume a to a virtual volume b to mapping of the virtual volume a to a virtual volume c (Fig. 7). Mogi does not show or suggest, either explicitly or implicitly, changing the mapping of one logical volume, which has actual memory regions, to a virtual volume to the mapping of another logical volume, which has also actual memory regions, to the virtual volume, as recited in claim 21.

Therefore, it would not have been obvious to one of ordinary skill in the art at the time the invention was made to modify Hirakawa with the element of Mogi in order to create the features that mapping of the first inner logical volume to the first logical volume is changed to mapping of the first inner logical volume to the first logical volume by a change-over instruction.

Furthermore, Guha merely shows that a subset of disk drives are powered on when the data in the subset of the disk drive is accessed, while the other subset of the disk drives are powered off on when the data in the other subset of disk drives is not accessed (paragraph [0029] on page 2). In Guha, the read cache is designated to alleviate the spin-up and seek time of a disk drive once initiated with power (paragraph [0129] on page 8). In other words, powering on a disk drive is controlled based on a timing of cache. Guha, however, does not show or suggest either explicitly or implicitly that a powering on a disk drive is controlled upon change-over from mapping of the first inner logical volume to the first logical volume to mapping of the first inner logical volume to the first logical volume.

As set forth above, combination of Hirakawa and Mogi does not show or suggest the features recited in claim 21, namely, mapping of the first inner logical volume to the first logical volume is changed to mapping of the first inner logical volume to the first logical volume by a change-over instruction. Therefore, even if Guha is combined with Hirakawa and Mogi, it would not have been obvious to the ordinary skill in the art at the time of the invention to create the features recited in claim 21, namely, that activation of the second set of disk drives that are mapped to the second inner logical volume starts in response to change-over from the first inner logical volume to the second inner logical volume

In sum, there is no suggestion or motivation in either Hirakawa, Mogi, or Guha to combine these features explicitly or implicitly, or in the knowledge generally available to one of ordinary skill in the art at the time the invention was made to embody all the features of the invention as recited in claim 21. Accordingly, claim 21 is not obvious in view of all the prior art recited.

#### Claims 31, 37

Claims 31 and 37 have the substantially same features as those of claim 21, at least with respect to the inner logical volume that are mapped to a first upper logical volume is changed over from the first inner logical volume to the second inner logical volume in response to the instruction from the computer connected to the channel adapter and activation of the second set of disk drives that are mapped to the second inner logical volume starting in response to change over from the first inner logical volume to the second inner logical volume. As such, the arguments set forth above are equally applicable here. Claim 21 being allowable, claims 31 and 37 must also be allowable.

#### Claims 22-30, 32-26, 38-51

As to dependent claims 22-30, 32-26 and 38-51, the arguments set forth above with respect to independent claim 21, 31 and 37 are equally applicable here. The corresponding base claim being allowable, claims 22-30, 32-26 and 38-51 must also be allowable.

#### Conclusion

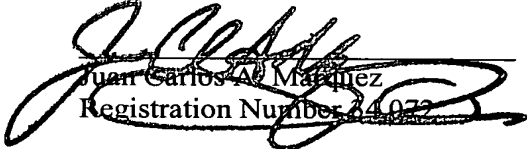
In view of all the above, Applicants respectfully submit that certain clear and distinct differences as discussed exist between the present invention as now claimed and the prior art references upon which the rejections in the Office Action rely. These differences are more

than sufficient that the present invention as now claimed would not have been anticipated nor rendered obvious given the prior art. Rather, the present invention as a whole is distinguishable, and thereby allowable over the prior art.

Favorable reconsideration of this application as amended is respectfully solicited. Should there be any outstanding issues requiring discussion that would further the prosecution and allowance of the above-captioned application, the Examiner is invited to contact the Applicants' undersigned representative at the address and phone number indicated below.

Respectfully submitted,

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